

# IRON AND STEEL

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The recession that began in March 2001, following the longest economic expansion in U.S. history—exactly 10 years or 120 months—ended in November 2001 (National Bureau of Economic Research, 2003§1). The recession lasted 8 months, slightly less than the average for recessions since World War II. U.S. apparent steel consumption, an indicator of economic growth, remained at 107 million metric tons (Mt) in 2002, the lowest amount since 1995, from a peak of 120 Mt in 2000.

World and regional economic performance showed weakness similar to that of the United States. Growth in world and U.S. economic output in 2002 was projected by the International Monetary Fund (IMF) to be 3.0% and 2.4%, respectively (Interpress Service, 2003§). The World Bank expected 2002 world economic output to increase only 1.7% (News.com.au, 2003§). The European Union's (EU) economic growth was expected to decline to 1.1% in 2002 from 1.8% in 2001 (Business, 2002§).

Substantial overcapacity among world steelmakers outside of North America produced a flood of low-priced imports into the United States since 1998 to the detriment of domestic steelmakers. In March 2002, the U.S. steel industry received temporary relief under Section 201 of the 1974 Trade Act—3 years of tariffs ranging up to 30% on certain steel imports. Relief from much of this import activity was expected to slow imports, increase steel prices, and allow the steel industry to restructure to become more competitive in world markets. Contrary to expectations, prices of hot-rolled and cold-rolled steel sheet peaked in midyear and began steady declines for the remainder of the year (Purchasing Magazine, unpub. data, 2003). Total relief from imports was nullified to some extent when the U.S. Department of Commerce exempted 727 imported steel products from the tariff in June. These exemptions were justified because the products were not sufficiently available from U.S. producers and their exclusion would not undermine the effectiveness of the safeguard on steel products. Meanwhile, the U.S. International Trade Commission appeared to be no longer interested in the steel industry's claims of injury by foreign producers by giving negative injury determinations in the four steel case votes held since March (Metals Watch, 2002§). By yearend, 2002 was the fourth highest steel import year in U.S. history.

Data regarding U.S. production of iron and steel and shipments of steel mill products were reported by the American Iron and Steel Institute (AISI). These data can be regarded as representing 100% of the raw steel producers in the United States. World production of iron and steel is reported by the International Iron and Steel Institute (IISI) and by foreign government agencies. Consistent with international usage and Federal Government policy, the U.S. Geological Survey reported all data on iron and steel in metric units unless otherwise noted.

## Environment

Steel mills receiving ferrous scrap have been exposed to radioactive materials without warning. Contaminated scrap is in the form of shielded radioactive sources, which are typically installed in measurement gauges used in manufacturing operations or in hospital equipment. Accidental meltings of radioactive scrap have cost an average of \$12 million to \$15 million. If a shielded radioactive source is disposed of improperly or sent for recycling as scrap metal, it may end up in a metal recycling facility and remelted with disastrous consequences. At least 26 accidental meltings of radioactive material have been reported in the United States since 1983 (U.S. Environmental Protection Agency, 2003§). The U.S. Environmental Protection Agency (EPA) began funding the first national program to systematically address the problem of "orphan" radioactive sources. The program is designed to assist States in retrieving and disposing of radioactive sources that are found in nonnuclear facilities, particularly scrap yards, steel mills, and municipal waste disposal facilities in a proper manner. Disposal may include recycling, reuse, or disposal at permitted facilities.

Mercury has been receiving increasing attention as a serious environmental pollutant because of its toxic and bioaccumulative properties. Bacteria in aquatic systems can convert mercury to methyl mercury which can be concentrated up the aquatic food chain, thereby contaminating fish and endangering humans and wildlife that consume fish. Mercury poisoning can cause central nervous system, kidney and liver damage, and impaired child development in humans. According to the EPA, significant synthetic mercury-emission sources include cement and lime kilns, coal and oil burning, copper smelting, garbage and hazardous waste incinerators, and petroleum refineries. Also, an estimated 15.6 metric tons per year (t/yr) of mercury is released from scrapped and recycled vehicles (Worden, 2001). The source of automotive mercury includes switches for convenience lighting, antilock braking systems, active ride control systems, high intensity discharge headlamps, and background lighting in automotive displays. An estimated 200 metric tons of mercury are in more than 210 million vehicles currently in use. Environmental groups are advocating "Design for Recycling," which is the design of products in a way that will ensure safe and economical recycling of mercury, and phasing out all automotive uses of mercury as soon as possible (Clean Car Campaign, 2001§).

Brownfields are abandoned, idled, or underused industrial and commercial sites, such as steel mills, where expansion or redevelopment is complicated by real or perceived environmental contamination that can add cost, time, or uncertainty to a redevelopment project (Envirotools, 2002§). There are about 130,000 to 450,000 contaminated commercial and industrial sites in the United States, and the cost of cleaning them may be as much as \$650 billion. In January, the Small Business Liability Relief and

Brownfields Revitalization Act (H.R. 2869) became law (Public Law 107-118). H.R. 2869 incorporates S. 350, the “Brownfields Revitalization and Environmental Restoration Act of 2001,” and H.R. 1831, the “Small Business Liability Protection Act.” The law codified and expanded the EPA’s current brownfields program by authorizing funding for assessment and cleanup of brownfields properties. It exempted from Superfund liability contiguous property owners, prospective purchasers, and clarified appropriate inquiry for innocent landowners. Also, it authorized funding for State response programs and limited EPA’s Superfund enforcement authority at sites cleaned up under a State response program. Certain household, small business, and nonprofit generators of municipal solid waste are exempted from liability for Superfund response costs at National Priority List sites. Settlements are expedited for certain persons based on a limited ability to pay contributors of hazardous substance.

## **Production**

Production of raw steel in the United States increased to 91.6 Mt from 90.1 Mt in 2001 (table 1). The AISI estimated raw steel production capability to be 103 Mt, down from 114 Mt in 2001. Production represented 88.8% of estimated capability compared with 79.2% in 2001.

Integrated steel producers smelted iron ores to liquid iron in blast furnaces and used basic oxygen furnaces to refine this iron with some scrap to produce raw liquid steel. The basic oxygen process was used to make 45.5 Mt of steel (American Iron and Steel Institute, 2002, p. 74). The use of this process declined slightly to 49.6% of total steel production in 2002 from 52.6% in 2001. The integrated steel industry in the United States consisted of 11 companies operating ironmaking and steelmaking facilities at 19 locations (Iron and Steelmaker, 2002). Several of these companies also operated nonintegrated plants and/or other steelmaking facilities at the same locations.

Minimills and specialty mills are nonintegrated steel producers that use electric arc furnaces (EAF) to melt low-cost raw materials (usually scrap). They also employ continuous casting machines and hot-rolling mills that are often closely coupled to the casting operation. Specialty mills include producers of stainless, alloy-electrical, and tool steel; high-temperature alloys; forged ingots; and other low-volume steel products. The nonintegrated sector of the industry, about 72 companies operating about 107 steelmaking plants, used the EAF steelmaking process to produce 46.1 Mt of steel, an increase of about 8% compared with that of 2001, and accounted for 50.4% of total steelmaking (American Iron and Steel Institute, 2002, p. 74; Iron and Steelmaker, 2002).

Raw liquid steel is mostly cast into semifinished products in continuous casting machines. Only 2.7% of U.S. production was cast in ingot form and subsequently rolled into semifinished forms; this represented a decrease of less than 2% compared with that of 2001. Continuous casting production was 89.1 Mt, or 97.2% of total steel production, compared with 87.5 Mt, or 97.2%, in 2001 (American Iron and Steel Institute, 2002, p. 75).

## **Consumption**

Steel mill products are produced at a steel mill either by forging or rolling into forms normally delivered for fabrication or use. Some companies purchase semifinished steel mill products from other steel companies and use them to produce finished steel products. To avoid double counting steel mill product shipments under these circumstances, steel mills identify any shipments of steel mill products to other companies that are reporters of steel mill product shipments. The accumulated shipments of all companies less the shipments to other reporting companies are identified as net shipments.

The U.S. apparent supply of steel mill products was the same in 2001 and 2002—107 Mt. The 6-year trend of steadily increasing net shipments of steel products to satisfy domestic demand ended in 1998, resumed its upward course in 1999 and 2000, and declined in 2001 to its lowest level since 1995 (American Iron and Steel Institute, 2002, p. 27). Shipments of steel mill products by U.S. companies increased by 1.1% to 90.7 Mt compared with those of 2001. Export shipments by AISI reporting companies decreased to 5.4 Mt from 5.6 Mt in 2001 (American Iron and Steel Institute, 2002, p. 45). Shipments to domestic customers increased by 1.1% during 2001 (American Iron and Steel Institute, 2002, p. 30). Shipments of construction and contractors’ products, the largest single end-use market, decreased by 4.7%. Automotive product shipments were almost the same as in 2001. Oil and gas, mining, quarrying, and lumbering industries shipments decreased by 28%. Shipments of industrial and agricultural machinery, equipment, and tools decreased by more than 10%. Steel service center shipments, appliance shipments, and containers, packaging, and shipping material shipments decreased by nearly 15%.

## **Prices**

The U.S. Department of Labor, Bureau of Labor Statistics, producer price index for steel mill products was up by 3.5% to 104.8 from 101.3 in 2001 (1982 base=100) (U.S. Department of Labor, Bureau of Labor Statistics, 2003§). The index was at a low of 98.3 during January and February and increased steadily to a high of 110.4 in October and November before declining to 104.8 in December.

## **Foreign Trade**

Exports of steel mill products decreased to 5.4 Mt from 5.6 Mt in 2001 (American Iron and Steel Institute, 2002, p. 46). Canada received the largest amount of U.S. exported steel, 3.4 Mt, unchanged from that in 2001. Mexico was again in second place, receiving

1.4 Mt, the same as in 2001. Imports of steel mill products increased by 8.4% to 29.6 Mt from 27.3 Mt in 2001 (American Iron and Steel Institute, 2002, p. 56). Brazil, Canada, the EU, Japan, the Republic of Korea, Mexico, Russia, and Turkey were major sources of steel mill product imports.

Imports of semifinished steel by steel companies must be taken into consideration in evaluating apparent consumption (supply) of steel mill products in the United States and the share of the market represented by imported steel. To avoid double counting the imported semifinished steel and the products produced from it, the amount of semifinished steel consumed by companies that also produced raw steel must be subtracted from domestic consumption. Between 1993 and 2000, semifinished steel imports were estimated to range between 2.5 million metric tons per year (Mt/yr) and 7.8 Mt/yr. Imports were 5.8 Mt/yr and 8.0 Mt/yr in 2001 and 2002, respectively. Prior to 1993, the amount was less than 0.2 Mt/yr. Taking the imported semifinished steel into consideration, the share of the U.S. steel market represented by imported steel was an estimated 28% in 2002 compared with 26% in 2001.

Regarding the reporting of imports and exports, "fabricated steel products" are produced from steel mill products but do not include products that incorporate steel products with other materials. Examples of fabricated steel products are fabricated structural steel and steel fasteners. "Other iron and steel products" refers to products that are not produced from steel mill products. Examples of other iron and steel products include iron or steel castings and direct reduced iron (DRI).

## World Review

World production of pig iron totaled about 604 Mt, 4.7% more than that of 2001 (table 10). In Asia, China continued to be the leading producer of pig iron in the world, producing almost 171 Mt, nearly 10% more than that of 2001. Japan and the United States followed with 81 Mt and 40 Mt, respectively. The Republic of Korea's production increased slightly. Russia and Ukraine were the only major pig iron producers in the Commonwealth of Independent States (CIS). Production in Russia had increased by 32% since 1998 and was the highest in the past 5 years. During 2002, Ukrainian production continued a rising 5-year trend. In North America, the only major producer of pig iron was the United States, where production decreased by nearly 5% from that of 2001. In South America, the only major pig iron producer was Brazil, producing nearly 28 Mt. Germany was the top producer in the EU, producing about the same amount as in 2001. India's production increased by 2.7% from that of 2001.

DRI production worldwide was about 38.8 Mt, a 1.3% decrease from that of 2001 and an 8.7% decrease from its peak production in 2000 (table 10). The leading technology was the Midrex process, followed by the HYL I and the HYL III processes. During 2002, 10.2 Mt of capacity was idle compared with 3.8 Mt in 2001. The leading producer of DRI was India, followed by, in descending order of tonnage, Iran, Mexico, and Venezuela (table 10). World capacity for DRI production was estimated to be nearly 48 Mt/yr (Midrex Direct Reduction Corp., 2002). Additional DRI capacity of 0.8 Mt was under construction in the Republic of Korea.

World production of raw steel exceeded 898 Mt, up from 847 Mt (revised) produced during 2001 (table 11). As in previous years, production varied widely among major regions of the world. Asian countries produced about 44% of the world's steel; the EU, 18%; and North America, 12%. During 2002, China was again the world's leading steel producer, exceeding 181 Mt, a gain of nearly 20% compared with that of 2001. In descending order, the leading producers behind China were Japan, the United States, Russia, the Republic of Korea, and Germany. These six countries accounted for 59% of world production. The combined steel production of the seven steel-producing countries in the CIS was more than 107 Mt, 2% greater than in 2001. Russia and Ukraine remained the top producers, continuing to increase production over the recent lows of 1998 (table 11).

## Outlook

In late 2002, IISI offered a revised forecast downward for 2002 and 2003 because of rapidly changing world economic conditions (International Iron and Steel Institute, 2002§). The global economic picture was described as so uncertain by the IISI that it considered it almost impossible to make predictions over the next 2 years with any degree of accuracy. Gross Domestic Product (GDP) growth was projected for 2002 and 2003 as 1.7% and 2.9%, respectively. A key influence on these projections is the economic activity of China, in which GDP is estimated to rise in 2002 and 2003 to 7.5% and 7.8%, respectively. The growth rate of the remainder of the world was projected for 2002 and 2003 as 1.6% and 2.8%, respectively. The IMF predicted global economic growth in 2003 to be 3.2% and 4.1% in 2004 (Interpress Service, 2003§). The World Bank predicted global economic growth in 2003 to be 2.3% and 3.2% in 2004 (News.com.au, 2003§).

U.S. economists polled by the Philadelphia Federal Reserve Bank were reported in November to have changed their projected annualized real GDP growth in the United States for 2003 to 2.6%, down from the previous estimate of 3% (Stundza, 2002a§). But at yearend, the Boston Federal Research Bank projected that economic growth should reach 3.0% to 3.5% by the end of 2003 (Business Channel, 2003§). The IMF forecast U.S. economic growth to be 2.2% and 3.6% in 2003 and 2004, respectively (Interpress Service, 2003§).

The IISI also revised projections downward of world consumption of finished steel products to 4.2% and 4.9% in 2002 and 2003, respectively (Stundza, 2002a§). China's finished steel-product consumption was projected to increase 14.8% and 10.3% in 2002 and 2003, respectively. Steel consumption increases in the rest of the world were an estimated 1.2% and 3.1% in 2002 and 2003, respectively. The North American Free Trade Association GDP growth forecast was 2.5% and 3.5% for 2002 and 2003, respectively.

After 18 months of decline, manufacturing grew for 7 months in 2002, but by yearend, the overall economy was barely growing (Stundza, 2002a§). J.P. Morgan Securities predicted that weak sales and volume numbers for some major metals processing and distribution firms should be exacerbated by the continuing weakness in U.S. manufacturing through 2003. Purchasing Magazine's

steel price forecast for hot-rolled, cold-rolled, and galvanized sheet combined was 4% less than that estimated for 2002 (Stundza, 2002b§). Nevertheless, 2003 may be a better year economically for the steelmaking industry than expected by many because of Section 201 tariffs, very low interest rates, continuing fiscal stimulus, strong productivity growth, low inflation, and very low business inventories.

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TABLE 1  
SALIENT IRON AND STEEL STATISTICS<sup>1</sup>

(Thousand metric tons)

	1998	1999	2000	2001	2002
United States:					
Pig iron:					
Production <sup>2</sup>	48,200	46,300	47,900	42,100	40,200
Exports <sup>3</sup>	87	82	72	44	34
Imports for consumption <sup>3</sup>	5,140	4,990	4,970	4,370	4,620
Direct-reduced iron:					
Production <sup>4</sup>	1,600	1,670	1,560	1,200	470
Exports <sup>3</sup>	5	3	2	1	1
Imports for consumption <sup>3</sup>	939	950	1,090	1,650	2,010
Raw steel production: <sup>5</sup>					
Carbon steel	88,000	87,600	92,500	82,400	83,700
Stainless steel	2,010	2,190	2,190	1,820	2,180
All other alloy steel	8,600	7,650	7,510	5,920	5,680
Total	98,600	97,400	102,000	90,100	91,600
Capability utilization, percent	86.8	83.8	86.1	79.2	88.8
Steel mill products:					
Net shipments <sup>2</sup>	92,900	96,300	98,900	89,700	90,700
Exports <sup>3</sup>	5,010	4,920	5,920	5,570	5,450
Imports <sup>3</sup>	37,700	32,400	34,400	27,300	29,600
Producer price index for steel mill products (1982=100.0) <sup>6</sup>	113.8	105.3	108.4	101.3	104.8
World production: <sup>7</sup>					
Pig iron	535,000	539,000 <sup>r</sup>	573,000 <sup>r</sup>	577,000 <sup>r</sup>	604,000
Direct-reduced iron <sup>4</sup>	37,200	38,200	42,500 <sup>r</sup>	39,300 <sup>r</sup>	38,800
Raw steel	770,000 <sup>r</sup>	784,000 <sup>r</sup>	845,000 <sup>r</sup>	847,000 <sup>r</sup>	898,000

<sup>r</sup>Revised.

<sup>1</sup>Data are rounded to three significant digits, except prices; may not add to totals shown.

<sup>2</sup>Data are from the American Iron and Steel Institute (AISI).

<sup>3</sup>Data are from the U.S. Census Bureau.

<sup>4</sup>Data are from the Midrex Direct Reduction Corp., Government, and companies.

<sup>5</sup>Raw steel is defined by AISI as steel in the first solid state after melting, suitable for rolling.

<sup>6</sup>Data are from the U.S. Department of Commerce Bureau of Labor Statistics.

<sup>7</sup>Data are from the U.S. Geological Survey and the International Iron and Steel Institute.

TABLE 2  
MATERIALS CONSUMED IN BLAST FURNACES AND PIG IRON PRODUCED<sup>1</sup>

(Thousand metric tons)

Material	2001	2002
Iron oxides: <sup>2</sup>		
Ores	249	234
Pellets	55,200	48,400
Sinter <sup>3</sup>	9,090	8,870
Total	64,500	57,500
Scrap <sup>4</sup>	1,490	907
Coke <sup>2</sup>	17,100	15,800
Pig iron, produced	42,100	40,200

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>American Iron and Steel Institute.

<sup>3</sup>Includes sintered ore and pellet fines, dust, mill scale, and other revert iron-bearing materials; also some nodules.

<sup>4</sup>Mainly briquetted turnings and borings, shredded scrap, etc.; scrap produced at blast furnaces and remelt not included.

TABLE 3  
DISTRIBUTION OF SHIPMENTS OF STEEL MILL PRODUCTS, BY STEEL TYPE, PRODUCT,  
AND MARKET<sup>1</sup>

(Thousand metric tons, unless otherwise specified)

	Quantity		Percent	
	2001	2002	2001	2002
Shipments by steel type:				
Carbon steel	83,700	84,400	93.30	93.10
Alloy steel	4,340	4,540	4.84	5.01
Stainless steel	1,670	1,720	1.86	1.89
Total	89,700	90,700	100.00	100.00
Steel mill products:				
Ingots, blooms, billets and slabs	783	1,130	0.87	1.24
Wire rods	3,010	2,900	3.35	3.19
Structural shapes-heavy	5,840	5,600	6.51	6.18
Steel piling	398	450	0.44	0.50
Plates-cut lengths	4,790	4,540	5.34	5.01
Plates-in coils	3,190	3,340	3.55	3.68
Rails	454	541	0.51	0.60
Railroad accessories	132	176	0.15	0.19
Bars, hot-rolled	6,240	6,390	6.95	7.04
Bars, light-shaped	1,060	1,040	1.18	1.14
Bars, reinforcing	6,290	6,060	7.01	6.68
Bars, cold finished	1,300	1,310	1.45	1.44
Tool steel	28	24	0.03	0.03
Pipe and tubing-standard pipe	1,090	1,200	1.22	1.32
Pipe and tubing-oil country goods	1,600	1,200	1.78	1.33
Pipe and tubing-line pipe	1,190	992	1.33	1.09
Pipe and tubing-mechanical tubing	803	765	0.89	0.84
Pipe and tubing-pressure tubing	27	22	0.03	0.02
Pipe and tubing-stainless	19	17	0.02	0.02
Pipe and tubing-structural	113	127	0.13	0.14
Pipe for piling	32	37	0.04	0.04
Wire	615	656	0.69	0.72
Tin mill products-blackplate	190	258	0.21	0.28
Tin mill products-tinplate	2,010	2,100	2.24	2.32
Tin mill products-tin-free steel	621	639	0.69	0.70
Tin mill products-tin coated sheets	80	102	0.09	0.11
Sheets, hot-rolled	16,600	17,600	18.48	19.44
Sheets, cold-rolled	11,300	11,500	12.53	12.69
Sheets and strip, hot dip galvanized	13,000	13,600	14.44	14.97
Sheets and strip, electrogalvanized	2,730	2,330	3.04	2.56
Sheets and strip, other metallic coated	1,730	1,920	1.92	2.12
Sheets and strip, electrical	436	401	0.49	0.44
Strip, hot rolled	625	151	0.70	0.17
Strip, cold rolled	1,530	1,570	1.70	1.73
Total	89,700	90,700	100.00	100.00
Shipments by markets:				
Service centers and distributors	24,600	24,900	27.36	27.47
Construction	19,500	18,600	21.77	20.54
Automotive	12,800	12,700	14.21	13.99
Machinery	1,320	1,270	1.47	1.40
Containers	2,930	2,940	3.27	3.24
All others	28,600	30,300	31.92	33.36
Total	89,700	90,700	100.00	100.00

<sup>1</sup>Data are rounded to no more than three significant digits, except percentages; may not add to totals shown.

Source: American Iron and Steel Institute.

TABLE 4  
U.S. IMPORTS AND EXPORTS OF STEEL MILL PRODUCTS, BY COUNTRY<sup>1</sup>

(Thousand metric tons)

Country	2001		2002	
	Imports	Exports	Imports	Exports
Argentina	403	6	387	2
Australia	623	4	677	3
Brazil	2,820	19	3,550	15
Canada	4,230	3,410	5,240	3,420
China	691	39	750	34
European Union	5,520	175	4,820	173
Finland	--	--	--	--
Japan	1,860	25	1,480	13
Korea, Republic of	2,020	13	1,680	7
Mexico	2,710	1,440	3,410	1,290
Russia	1,540	--	1,650	--
South Africa	473	4	389	2
Sweden	190	2	170	1
Taiwan	518	11	345	11
Turkey	860	--	1,240	--
Ukraine	461	--	337	--
Venezuela	308	29	444	18
Other	2,060	390	3,090	455
Total	27,300	5,570	29,600	5,450

-- Zero.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

Source: American Iron and Steel Institute.



TABLE 5  
U.S. EXPORTS OF IRON AND STEEL PRODUCTS<sup>1</sup>

(Thousand metric tons)

	2001	2002
Steel mill products:		
Ingots, blooms, billets, slabs	127	102
Wire rods	41	60
Structural shapes-heavy	363	270
Steel piling	10	7
Plates-cut lengths	407	491
Plates-in coils	279	292
Rails-standard	66	60
Rails-other	6	17
Railroad accessories	14	10
Bars, hot-rolled	347	390
Bars, light-shaped	112	81
Bars, concrete reinforcing	114	153
Bars, cold-finished	101	93
Tool steel	24	22
Pipe and tubing, standard pipe	61	75
Pipe and tubing, oil country goods	217	177
Pipe and tubing, line pipe	169	240
Pipe and tubing, mechanical tubing	3	5
Pipe and tubing, stainless	35	26
Pipe and tubing, nonclassified	294	278
Pipe and tubing, structural	116	101
Pipe for piling	5	2
Wire	140	135
Tin mill products-blackplate	2	2
Tin mill products-tinplate	226	212
Tin mill products-tin-free steel	24	19
Sheets, hot-rolled	447	408
Sheets, cold-rolled	547	533
Sheets and strip, hot-dip galvanized	471	452
Sheets and strip, electrogalvanized	211	153
Sheets and strip, other metallic coated	161	138
Sheets and strip, electrical	82	80
Strip, hot-rolled	79	99
Strip, cold-rolled	270	268
Total	5,570	5,450
Fabricated steel products:		
Structural shapes-fabricated	283	202
Rails-used	19	9
Railroad products	32	12
Wire rope	11	8
Wire-stranded products	36	37
Wire-other products	19	17
Springs	79	77
Nails and staples	28	27
Fasteners	286	306
Chains and parts	22	23
Grinding balls	17	17
Pipe and tube fittings	35	32
Other <sup>2</sup>	56	106
Total	923	873
Grand total	6,500	6,320

See footnotes at end of table.

TABLE 5--Continued  
U.S. EXPORTS OF IRON AND STEEL PRODUCTS<sup>1</sup>

(Thousand metric tons)

	2001	2002
Cast iron and steel products:		
Cast steel pipe fittings	35	32
Cast iron pipe and fittings	64	95
Cast steel rolls	8	8
Cast grinding balls	22	31
Granules-shot and grit	23	21
Other castings	39	41
Total	191	228

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Includes shapes cold formed, sashes and frames, fence and sign post, and architectural and ornamental work, and conduit.

Source: American Iron and Steel Institute.

TABLE 6  
U.S. IMPORTS OF MAJOR IRON AND STEEL PRODUCTS<sup>1</sup>

(Thousand metric tons)

	2001	2002
Steel mill products:		
Ingots, blooms, billets, and slabs	5,840	8,020
Wire rods	2,730	3,170
Structural shapes-heavy	894	656
Steel piling	144	145
Plates-cut lengths	854	765
Plates-in coils	649	884
Rails and railroad accessories	215	218
Bars, hot-rolled	1,330	1,470
Bars, light-shaped	162	171
Bars, reinforcing	1,600	1,160
Bars, cold-finished	315	263
Tool steel	142	141
Pipe and tubing, standard pipe	1,040	989
Pipe and tubing, oil country goods	828	444
Pipe and tubing, line pipe	1,220	1,030
Pipe and tubing, mechanical tubing	451	488
Pipe and tubing, pressure tubing	72	94
Pipe and tubing, stainless	84	76
Pipe and tubing, nonclassified	25	21
Pipe and tubing, structural	408	351
Pipe for piling	19	14
Wire	623	697
Tin mill products-blackplate	134	90
Tin mill products-tinplate	343	254
Tin mill products-tin-free steel	147	105
Sheets, hot-rolled	2,190	3,520
Sheets, cold-rolled	2,790	1,730
Sheets and strip, hot-dip galvanized	1,340	1,920
Sheets and strip, electrogalvanized	159	166
Sheets and strip, other metallic coated	240	299
Sheets and strip, electrical	99	64
Strip, hot-rolled	55	89
Strip, cold-rolled	149	148
Total	27,300	29,600
Fabricated steel products:		
Structural shapes, fabricated	729	710
Rails, used	175	195
Railroad products	79	78
Wire rope	103	100
Wire-stranded products	184	191
Springs	422	433
Nails and staples	541	681
Fasteners	954	1,080
Chains and parts	95	98
Pipe and tube fittings	177	151
Other	466	522
Total	3,930	4,240
Grand total	31,200	33,900
Cast iron and steel products:		
Cast steel pipe fittings	177	151
Cast iron pipe and fittings	46	43
Other products	360	375
Total	583	569

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

Source: American Iron and Steel Institute.

TABLE 7  
U.S. IMPORTS OF STAINLESS STEEL<sup>1</sup>

(Metric tons)

Product	2001	2002
Semifinished	279,000	265,000
Plate	47,000	60,200
Sheet and strip	43,200	45,800
Bars and shapes	95,800	84,000
Wire and wire rods	83,000	78,800
Pipe and tube	84,200	75,600
Total	632,000	609,000

<sup>1</sup>Data are rounded to no more than three significant digits;  
may not add to totals shown.

Source: American Iron and Steel Institute.

TABLE 8  
U.S. SHIPMENTS OF IRON AND STEEL CASTINGS<sup>1</sup>

(Thousand metric tons)

	2001	2002
Ductile iron castings	3,800 <sup>r</sup>	3,690
Gray iron castings	4,360 <sup>r</sup>	3,990
Malleable iron castings	122	115
Steel castings	706	599
Steel investment castings	69 <sup>r</sup>	60
Total	9,060 <sup>r</sup>	8,450

<sup>r</sup>Revised.

<sup>1</sup>Data are rounded to no more than three significant digits;  
may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 9  
COAL AND COKE AT COKE PLANTS<sup>1, 2</sup>

(Thousand metric tons)

	2001	2002
Coal, consumption	23,700	20,400
Coke: <sup>3</sup>		
Production	17,200	14,600
Exports	970	539
Imports	2,120	2,810
Consumption, apparent	18,400	17,200

<sup>1</sup>Data are rounded to no more than three significant digits.

<sup>2</sup>Includes furnace and merchant coke plants.

<sup>3</sup>Coke production and consumption do not include breeze.

Source: Energy Information Administration, Quarterly Coal Report,  
DOE/EIA-0121(2001/4Q).

TABLE 10  
 PIG IRON AND DIRECT-REDUCED IRON: WORLD PRODUCTION, BY COUNTRY<sup>1, 2, 3, 4</sup>

(Thousand metric tons)

Country <sup>5</sup>	1998	1999	2000	2001	2002 <sup>e</sup>
Albania <sup>e</sup>	10	10	10	10	10
Algeria <sup>e</sup>	800 <sup>r</sup>	1,000 <sup>r</sup>	1,100 <sup>r</sup>	1,250 <sup>r</sup>	1,250
Argentina:					
Pig iron	2,122	1,985	2,188	1,909 <sup>r</sup>	1,910 <sup>6</sup>
Direct-reduced iron	1,538	989	1,420	1,280	1,450 <sup>6</sup>
Australia	7,724	7,468	7,000 <sup>e</sup>	7,200 <sup>e</sup>	7,300
Austria	4,022	3,913	4,318	4,300	4,300
Belgium	8,730	8,472	8,472	7,732 <sup>r</sup>	8,053 <sup>6</sup>
Bosnia and Herzegovina <sup>e</sup>	100	100	100	100	100
Brazil:					
Pig iron	25,111 <sup>r</sup>	25,060 <sup>r</sup>	27,723 <sup>r</sup>	27,441 <sup>r</sup>	27,781 <sup>6</sup>
Direct-reduced iron	336	400	418	400 <sup>e</sup>	400
Bulgaria	1,389	1,130	1,220	1,160 <sup>r</sup>	1,120
Burma: <sup>e</sup>					
Pig iron	2 <sup>r</sup>	2	2	2	2
Direct-reduced iron	40	40	40	40	40
Canada:					
Pig iron	8,937	8,783	8,900 <sup>r</sup>	878 <sup>r</sup>	8,800 <sup>p</sup>
Direct-reduced iron	1,240	920	920 <sup>r</sup>	920 <sup>r</sup>	920 <sup>p</sup>
Chile	993	1,030	1,065 <sup>r</sup>	897 <sup>r</sup>	964 <sup>6</sup>
China <sup>7</sup>	118,600	125,390	131,010	155,540 <sup>r</sup>	170,750 <sup>6</sup>
Colombia	256	264	272	319 <sup>r</sup>	309 <sup>6</sup>
Czech Republic	4,982	4,022	4,621	4,671 <sup>r</sup>	4,700
Egypt:					
Pig iron <sup>e</sup>	1,334 <sup>6</sup>	1,300 <sup>r</sup>	1,400 <sup>r</sup>	1,400 <sup>r</sup>	1,400
Direct-reduced iron	1,610	1,670	2,110 <sup>r</sup>	2,370	2,530
Finland	2,912	2,954	2,983	2,900	3,000
France	13,603	13,854	13,621	12,004 <sup>r</sup>	13,217 <sup>6</sup>
Germany:					
Pig iron	30,162	27,931	30,846	29,184 <sup>r, 8</sup>	29,419 <sup>6</sup>
Direct-reduced iron	450	400	400 <sup>e</sup>	400	400
Hungary	1,258	1,309	1,340	1,226 <sup>r</sup>	1,306 <sup>6</sup>
India:					
Pig iron	20,194	20,139	21,321	21,900	22,000
Direct-reduced iron	5,260	5,220	5,440	5,590	5,600
Indonesia, direct-reduced iron <sup>e</sup>	1,640	1,740	1,820	1,480	1,500
Iran:					
Pig iron	2,087	2,147	2,202	2,300 <sup>r</sup>	2,400
Direct-reduced iron	3,690	4,120	4,740	5,000 <sup>e</sup>	5,280
Italy	10,704	10,509	11,223	10,650 <sup>r</sup>	9,736 <sup>6</sup>
Japan	74,981	74,520	81,071	78,836	80,979 <sup>6</sup>
Kazakhstan	2,594	3,438	4,000	3,907 <sup>r</sup>	4,089 <sup>6</sup>
Korea, North <sup>e</sup>	800 <sup>r</sup>	800 <sup>r</sup>	800 <sup>r</sup>	800 <sup>r</sup>	800
Korea, Republic of	23,229	23,329	24,937	25,898	26,500
Libya, direct-reduced iron	1,010	1,330	1,500 <sup>e</sup>	1,090	1,170
Malaysia, direct-reduced iron <sup>e</sup>	1,000	1,000	1,260	1,300	1,400
Mexico:					
Pig iron	4,532	4,808	4,856	4,500 <sup>e</sup>	4,000
Direct-reduced iron	5,584	6,070	5,589	4,500 <sup>e</sup>	4,000
Morocco <sup>e</sup>	15	15	15	15	15
Netherlands <sup>8</sup>	5,561	5,320	4,969	5,305 <sup>r</sup>	5,381 <sup>6</sup>
New Zealand	609	620	600 <sup>e</sup>	600 <sup>e</sup>	600
Norway <sup>e</sup>	70	60	60	60	60
Pakistan <sup>e</sup>	1,500	1,500	1,500	1,500	1,500
Paraguay	66	61	82	71 <sup>r</sup>	80 <sup>6</sup>
Peru:					
Pig iron	283 <sup>r</sup>	250 <sup>r</sup>	327 <sup>r</sup>	330 <sup>r</sup>	330 <sup>p</sup>
Direct-reduced iron	110	50	80	80 <sup>e</sup>	80
Poland	6,128	6,128	6,492	5,440 <sup>r</sup>	5,500
Portugal	365	389	382	82 <sup>r</sup>	--
Qatar, direct-reduced iron	706	670	620	730	750

See footnotes at end of table.

TABLE 10--Continued  
 PIG IRON AND DIRECT-REDUCED IRON: WORLD PRODUCTION, BY COUNTRY<sup>1, 2, 3, 4</sup>

(Thousand metric tons)

Country <sup>5</sup>	1998	1999	2000	2001	2002 <sup>e</sup>
Romania	4,541	2,969	3,069	3,085 <sup>r</sup>	3,100
Russia:					
Pig iron	34,827	40,854	44,618	44,980	46,060 <sup>6</sup>
Direct-reduced iron	1,550	1,880	2,000	1,900	2,000
Saudi Arabia, direct-reduced iron	2,268	2,343	3,090	2,880	3,290
Serbia and Montenegro	826	135	563	461	485
Slovakia	2,756	2,987	3,167 <sup>r</sup>	3,255 <sup>r</sup>	3,100
South Africa:					
Pig iron	5,650	4,587	6,300	5,800	5,800
Direct-reduced iron	1,070	1,260	1,530	1,560	1,700
Spain	4,278	4,146	4,059	4,094 <sup>r</sup>	3,978 <sup>6</sup>
Sweden	3,373	3,212	3,146	3,614 <sup>r</sup>	3,700
Switzerland <sup>c</sup>	100	100	100	100	100
Taiwan	9,374	9,020	9,971 <sup>r</sup>	10,316 <sup>r</sup>	10,524 <sup>6</sup>
Trinidad and Tobago, direct-reduced iron	1,073	1,379	1,530 <sup>r</sup>	2,186 <sup>r</sup>	2,186 <sup>6</sup>
Tunisia	123	178	196	192 <sup>r</sup>	152
Turkey	456	315	300	300 <sup>e</sup>	350
Ukraine	20,840	21,937	25,700	26,400	27,560 <sup>6</sup>
United Kingdom	12,574	12,399	10,891	9,861 <sup>r</sup>	8,579 <sup>6</sup>
United States:					
Pig iron	48,200	46,300	47,900	42,100	40,200 <sup>6</sup>
Direct-reduced iron	1,600	1,700 <sup>r</sup>	1,600	120 <sup>r</sup>	470
Venezuela, direct-reduced iron	5,424	5,071	6,401	5,473	3,608 <sup>6</sup>
Zimbabwe <sup>c</sup>	217	228	240	240	150
Grand total	572,000	578,000	616,000 <sup>r</sup>	616,000 <sup>r</sup>	642,000
Of which:					
Pig iron	535,000	539,000 <sup>r</sup>	573,000 <sup>r</sup>	577,000 <sup>r</sup>	604,000
Direct-reduced iron	37,200	38,200	42,500 <sup>r</sup>	39,300 <sup>r</sup>	38,800

<sup>e</sup>Estimated. <sup>p</sup>Preliminary. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Production is pig iron unless otherwise specified.

<sup>3</sup>Direct-reduced iron is obtained from ore by reduction of oxides to metal without melting.

<sup>4</sup>Table excludes ferroalloy production except where otherwise noted. Table includes data available through August 10, 2003.

<sup>5</sup>In addition to the countries listed, Vietnam has facilities to produce pig iron and may have produced limited quantities during 1998-2002, but output is not reported and available information is inadequate to make reliable estimates of output levels.

<sup>6</sup>Reported figure.

<sup>7</sup>Figures reported by State Statistical Bureau that the Chinese Government considers as official statistical data.

<sup>8</sup>Includes blast furnace ferroalloys.



TABLE 11  
RAW STEEL: WORLD PRODUCTION, BY COUNTRY<sup>1, 2, 3</sup>

(Thousand metric tons)

Country <sup>4</sup>	1998	1999	2000	2001	2002 <sup>c</sup>
Albania <sup>c</sup>	15	15	65 <sup>r</sup>	94 <sup>r</sup>	100
Algeria	400 <sup>c</sup>	758	842	850 <sup>r</sup>	1,090 <sup>s</sup>
Angola <sup>c</sup>	9	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	--
Argentina	4,210 <sup>r</sup>	3,797 <sup>r</sup>	4,472 <sup>r</sup>	4,107	4,363 <sup>s</sup>
Australia	8,798	8,158	7,812	7,600	8,242 <sup>p</sup>
Austria	5,298	5,213	5,725	5,887 <sup>r</sup>	6,208 <sup>s</sup>
Azerbaijan	8	--	--	--	--
Bangladesh <sup>c, 6</sup>	35	36	35	30 <sup>r</sup>	30
Belarus	1,412	1,449	1,623	1,500	1,500
Belgium	11,427	10,972	11,637	10,783 <sup>r</sup>	11,495 <sup>s</sup>
Bosnia and Herzegovina <sup>c</sup>	50	60	77	84 <sup>r</sup>	85
Brazil <sup>7</sup>	25,800 <sup>r</sup>	24,996 <sup>r</sup>	27,865 <sup>r</sup>	26,717 <sup>r</sup>	29,604 <sup>s</sup>
Bulgaria	2,216	1,889	2,017	1,942 <sup>r</sup>	2,000
Burma <sup>c</sup>	24	24	24	24	24
Canada	15,930	16,300	15,900 <sup>r</sup>	16,300 <sup>r</sup>	16,300 <sup>p</sup>
Chile <sup>7</sup>	1,171	1,291	1,352	1,247	1,280 <sup>s</sup>
China <sup>8</sup>	115,590	124,260	128,500	151,630 <sup>r</sup>	181,550 <sup>s</sup>
Colombia	636	534	660	638 <sup>r</sup>	663 <sup>s</sup>
Croatia	105	77	71	58	65
Cuba	283	303	327 <sup>r</sup>	270 <sup>r</sup>	270
Czech Republic	6,498	5,613	6,216	6,316 <sup>r</sup>	6,500
Denmark	790	748	803 <sup>r</sup>	746 <sup>r</sup>	392
Dominican Republic	36	43	36 <sup>r</sup>	36 <sup>r, e</sup>	36
Ecuador	46	53	58	60 <sup>r</sup>	67 <sup>s</sup>
Egypt	2,870	2,619	2,820 <sup>c</sup>	3,800 <sup>r</sup>	4,200
El Salvador	43	34	41	39	49 <sup>s</sup>
Finland	3,932	3,956	4,096	3,938 <sup>r</sup>	4,004 <sup>s</sup>
France	20,126	20,211	21,002 <sup>r</sup>	19,431 <sup>r</sup>	20,524 <sup>s</sup>
Georgia	56 <sup>r</sup>	7 <sup>r</sup>	5 <sup>r</sup>	5 <sup>r</sup>	5
Germany	44,046	42,056	46,376	44,775 <sup>r</sup>	44,999 <sup>s</sup>
Ghana, all from scrap	75	75	75	75	75
Greece	1,109	951	1,056	1,281 <sup>r</sup>	1,835 <sup>s</sup>
Guatemala	28	80	166	202 <sup>r</sup>	216 <sup>s</sup>
Hong Kong <sup>c</sup>	350	450	500	500	500
Hungary	1,821	1,813	1,871	2,056 <sup>r</sup>	2,000
India	23,480	24,269	26,924	27,291 <sup>r</sup>	28,814 <sup>s</sup>
Indonesia <sup>c</sup>	NA	2,890	3,010	2,780 <sup>r</sup>	3,000
Iran	5,608	6,277	6,600	6,900 <sup>c</sup>	7,300
Iraq <sup>c</sup>	50 <sup>r</sup>	50 <sup>r</sup>	50	50	25
Ireland	358	335	375	110 <sup>r</sup>	--
Israel <sup>c</sup>	280	280	270	220	150
Italy	25,798	24,964	26,544	26,483 <sup>r</sup>	25,930 <sup>s</sup>
Japan	93,548	94,192	106,444	102,866	107,745 <sup>s</sup>
Jordan <sup>c</sup>	30	30	30	30	30
Kazakhstan	3,089	4,116	4,770	4,691 <sup>r</sup>	4,868 <sup>s</sup>
Kenya	25 <sup>c</sup>	--	--	--	--
Korea, North <sup>c</sup>	1,000	1,000	1,000	1,000	1,000
Korea, Republic of	39,896	41,042	43,107	43,852	45,390 <sup>s</sup>
Latvia	469	484	500	510 <sup>c</sup>	505
Libya	925	945	1,055	846 <sup>r, c</sup>	1,000
Luxembourg	2,592	2,477	2,571	2,725 <sup>r</sup>	2,736 <sup>s</sup>
Macedonia	49	49	50	50	50
Malaysia	1,903 <sup>r</sup>	2,770 <sup>r</sup>	3,650 <sup>r</sup>	4,100 <sup>r</sup>	4,200
Mexico	14,182	15,243	15,586	13,292	14,051 <sup>s</sup>
Moldova	718	796	909	966	900
Morocco <sup>c</sup>	5	5	5	5	5

See footnotes at end of table.

TABLE 11--Continued  
RAW STEEL: WORLD PRODUCTION, BY COUNTRY<sup>1, 2, 3</sup>

(Thousand metric tons)

Country <sup>4</sup>	1998	1999	2000	2001	2002 <sup>c</sup>
Netherlands	6,379	6,075	5,667	6,037 <sup>r</sup>	6,144 <sup>5</sup>
New Zealand	756	744	765	770 <sup>e</sup>	750
Nigeria <sup>c</sup>	2	--	--	--	--
Norway	644	611	620	635 <sup>r</sup>	694
Pakistan <sup>c</sup>	494 <sup>5</sup>	500	500	500	500
Paraguay	56	56	77	71 <sup>r</sup>	80 <sup>5</sup>
Peru	631	559	749	750 <sup>e</sup>	750
Philippines	880	530	530 <sup>e</sup>	530 <sup>e</sup>	530
Poland	9,915	8,853	10,498	8,809 <sup>r</sup>	8,369 <sup>5</sup>
Portugal	854	1,044	1,060	728 <sup>r</sup>	800
Qatar	646	629	744 <sup>r</sup>	908 <sup>r</sup>	1,000
Romania	6,335	4,392	4,770	4,930 <sup>r</sup>	5,000
Russia	43,822	51,524	59,098	59,030 <sup>r</sup>	59,777 <sup>5</sup>
Saudi Arabia	2,356	2,610	2,973	3,413 <sup>r</sup>	3,800
Serbia and Montenegro	949	226	682	598	596
Singapore <sup>c</sup>	500	500	500	400	400
Slovakia	3,428	3,569	3,447 <sup>r</sup>	3,676 <sup>r</sup>	3,700
Slovenia	405	405	519	462 <sup>r</sup>	480
South Africa	7,506	6,830	8,481	8,821	9,000
Spain	14,827	14,886	15,920	16,500 <sup>r</sup>	16,358 <sup>5</sup>
Sri Lanka <sup>c</sup>	30	30	30	30	30
Sweden	5,062	5,075	5,227	5,518 <sup>r</sup>	5,754 <sup>5</sup>
Switzerland	1,018	1,037	1,140	1,000	1,000
Syria <sup>c</sup>	70	70	70	70	70
Taiwan	17,192	16,027	17,302	17,336	18,255 <sup>5</sup>
Thailand	1,814	1,532 <sup>r</sup>	2,100	2,127 <sup>r</sup>	2,200
Trinidad and Tobago	809 <sup>r</sup>	762 <sup>r</sup>	753 <sup>r</sup>	696 <sup>r</sup>	696
Tunisia	171	229	237	239 <sup>r</sup>	220
Turkey	13,351	14,309	14,325	14,900	16,000
Uganda <sup>c</sup>	7	8	7	7	7
Ukraine	23,461	27,390	31,780	33,110	34,538 <sup>5</sup>
United Kingdom	17,066	16,634	15,022	13,610 <sup>r</sup>	11,718 <sup>5</sup>
United States	98,600	97,400 <sup>r</sup>	102,000	90,100	91,600 <sup>5</sup>
Uruguay	52	45	38	31	34 <sup>5</sup>
Uzbekistan	344	343 <sup>e</sup>	420	460	450
Venezuela	3,553	3,261	3,835	3,813 <sup>r</sup>	4,164 <sup>5</sup>
Vietnam	306	308	306	319 <sup>r</sup>	320
Zimbabwe <sup>c</sup>	220	255	258	156	150
Total	770,000 <sup>r</sup>	784,000 <sup>r</sup>	845,000 <sup>r</sup>	847,000 <sup>r</sup>	898,000

<sup>c</sup>Estimated. <sup>p</sup>Preliminary. <sup>r</sup>Revised. NA Not available. -- Zero.

<sup>1</sup>World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Steel formed in solid state after melting, suitable for further processing or sale; for some countries, includes material reported as "liquid steel," presumably measured in the molten state prior to cooling in any specific form.

<sup>3</sup>Table includes data available through August 1, 2003.

<sup>4</sup>In addition to the countries listed, Mozambique is known to have steelmaking plants, but available information is inadequate to make reliable estimates of output levels.

<sup>5</sup>Reported figure.

<sup>6</sup>Data for year ending June 30 of that stated.

<sup>7</sup>Excludes castings.

<sup>8</sup>Figures reported by State Statistical Bureau that Chinese Government considers as official statistical data.